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Emergency Communications

Shelter Management

Psychological Aspects of Disaster

Nuclear Attack Hazard Probabilities

Emergency Health Stockpiling

EMERGENCY MEASURES ORGANIZATION

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EMERGENCY COMMUNICATIONS

The following article was prepared for the DIGEST *by K. E. Holmes, Communications Officer with the federal Emergency Measures Organization.*

Introduction

THE SCOPE of this title covers a wide field and this article will only attempt to describe briefly what is happening in the field of emergency communications for continuity of government and for public survival within Canada.

Federal Emergency Communications

The Army is charged with the provision of emergency communications for the Federal Government to regional headquarters in each province and to zone headquarters within provinces, the zone being an administrative subdivision of certain provinces, rendered necessary because of their size. These communications are provided by leased telephone and teletype landline circuits, as well as by radio teletype circuits down to regional headquarters. This teletype system is operated and maintained by the Army across Canada and links the regions through major telegraph relay centres, and, by the use of high frequency and medium frequency radio sets of the requisite power ensures continuity of communication. Other important national radio systems such as those of the Department of Transport and the RCMP are also being linked in to these regional headquarters. Connections are also provided to the communication systems of the RCN and RCAF.

The Department of Transport is charged with the responsibility of administering and controlling the Emergency National Telecommunications Organization (ENTO). This organization carries out planning in peacetime for the most efficient use of the civil telecommunications system in war and for its control in time of war. The work of ENTO is carried out by an Interdepartmental Emergency Telecommunications Committee which consists of all interested departments and ENTO also has an Advisory Committee of Commercial Telecommunications Agencies consisting of the main civil telecommunications agencies. Some of the tasks assigned to ENTO and currently under study or being conducted are:

a. Preparation and maintenance of lists of essential circuits, with an indication of restoration priority.
b. Provision of a technical control organization to ensure rapid and effective control of all main commercial telecommunications systems in the country.
c. Provision of by-pass and alternate routes around the more likely target areas.
d. Provision for the control and co-ordination of radio frequency assignment and monitoring.

Furthermore, agreement has been reached on the decentralization of ENTO to regions and Regional Emergency Telecommunication Committees are being established.

Provincial Emergency Communications

Provinces are responsible for their own emergency communications from regional headquarters to zones and thence on to counties (or equivalent areas) and to municipalities. The fullest use will be made of the existing telephone and telegraph systems, but these may be disrupted by an attack or by the effects of fallout on operating and maintenance personnel. Most provinces are therefore planning to have a radio backup system from regional headquarters to zone headquarters and within zones. They may have more than one system in order to provide alternate means of communication. They look to an existing provincial system such as Forestry or Highways to provide general radio coverage, with additional links to reach down to zone headquarters. They may also have, in addition, a special emergency radio network from regional headquarters to zone headquarters. From zone headquarters

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down to municipalities they may have one or two radio networks, depending on the requirements of the area.

In any of these areas, particularly in zones, radio amateurs may be employed as communication officers and/or operators and their stations may be enrolled for use in civil emergency. All amateur stations have to close down in a war emergency and their frequency bands are taken over for defence purposes. Certain sections of these bands have been assigned for civil emergency use. If amateur stations are to be used in a civil emergency, there is an established procedure under which they will be reactivated as civil emergency stations. In any case, there is a great need for training additional radio operators and many places in Canada have trained civil defence operators to the standard of Restricted Radiotelephone Operator (RRO). This is a commercial certificate obtained after an examination by the Department of Transport.

Municipal Emergency Communications

The requirements for municipalities can be separated broadly into those for the designated target areas and those for other areas:

a. *Target Areas*

There are thirteen emergency services required for municipal emergency operations and the more important are Engineer, Fire, Health, Police, Radiological Defence and Welfare. Some of these, such as Engineer, Fire and Police, will already have communications for their peace-time functions and it is necessary to examine these communications to see whether they are adequate for their emergency tasks or whether they need augmenting. In addition, there will be required communications for emergency government and for other services such as Health, Welfare and Radiological Defence. The Army has established Target Area Headquarters adjacent to probable target areas and these are designed to control re-entry and other military operations and functions in the event of an attack. Sector headquarters will also be established where necessary to effect closer control of re-entry operations. Civil government emergency headquarters need to be established adjacent to the Military headquarters and the civil emergency services need to have representatives there and at the Sector headquarters with a communications capability. Thus, there is a need for civil emergency and municipal services communications from the emergency headquarters via sector to the municipalities and to the municipal services in the municipalities within the target area. Plans on these lines have been developed and are being implemented for a number of the target areas.

b. *Other Areas*

In the main, the services which will be most occupied in areas other than target areas are Fire, Police, Radiological Defence, Health and Welfare. These areas require to be organized on a basis such as a county, and their communications will depend on the location of the area in relation to a target area and its role, such as reception. Police and Fire communications will require examination and expansion, if necessary, to ensure that they are adequate for their emergency tasks. A radio network may be required for the emergency services in the area and a civil emergency network may be required to link up the county headquarters with the main municipalities in the county. It is possible that, in some cases, these two networks could be combined into one. It is in this field, as in the zone, that radio amateurs will be found to be most useful. Many area plans have been developed along these lines.

General Considerations

Some other factors that have to be taken into account in provincial and municipal communications planning are:

a. Provincial and target area plans must fit in closely with Army plans for survival operations, so that considerable liaison is required to achieve this co-ordination.

b. All radio stations included in civil emergency communications plans must be licensed by the Minister of Transport and each radio station must be assigned a specific frequency or frequencies on which to operate. The Federal Government contributes toward the cost of emergency communications and Federal EMO must ensure that the funds expended in this regard are justified. This requires close co-operation between the provinces and municipalities who plan and implement the emergency communi-

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A COURSE ON SHELTER MANAGEMENT

Mr. E. G. Sherring, former Senior Special Weapons Instructor, Canadian Civil Defence College, Arnprior, has recently been appointed Assistant Training Officer on the staff of the federal Emergency Measures Organization. Shortly before leaving the College for EMO Mr. Sherring attended the Shelter Management Course at the Eastern Training Centre, Brooklyn, N.Y. In the following report Mr. Sherring describes in diary form his experiences during the Course.

Sunday, April 29th.

AT 1400 hours the administrative instructions were given. These conformed closely to the College's administrative instructions, giving the starting time of classes, finishing time, hours for meals, etc. We were informed that a period of up to 3 days would be spent in the shelter and that we would not know the exact time that we would enter the shelter or leave the shelter. We were instructed to report for class at 0800 hours, Monday the 30th April ready to go into shelter at any time. No special equipment was to be carried other than what we would normally have on our person during a normal working day. The number in the class was 23 of whom 18 were males and 5 females.

Monday—April 30th.

Classes started at 0800 hours on Monday morning. The class listened to a lecture on fallout shelters and national civil defence. The federal responsibilities and the priority of the various tasks were outlined and a suggested community government organization was described. Morning break was from 0945-1000 hours. At 1000 we returned to class and were informed by a school instructor that an ALERT had sounded and that we should go to shelter. The class moved to the shelter approximately a 5 minute walk from the classroom.

Shelter—General Description

The size of the shelter was roughly 12 feet wide by 20 feet long and 8 feet high. It contained the following equipment:

10-3 tiered bunks. Each bunk contained a mattress, 1 blanket and 1 pillow case but no pillow.

There were overhead lights which operated on a rheostat and could be dimmed or brightened as desired. The shelter had 6 one-way windows whereby school personnel could observe the candidates without being seen. It had a phone, which in theory was connected to a higher level of control, and a battery operated radio. There was a microphone suspended from the ceiling which picked up the conversation within the room, a steel cabinet containing all the shelter supplies, a small bathroom approximately 3 feet by 4 feet in one corner. The shelter contained no tables or chairs. The ventilation was a gravity system. However, a fan had been positioned outside to blow air across the top of the shelter and assist the circulation of air within.

Mr. Denny Forbes, the director of the school, entered the shelter with us and informed the class that he would act as the Shelter Manager for this course. There had been no delegation of duties or responsibilities prior to our entry, rather the class entered the shelter as if they were strangers on any street when an ALERT sounded and made their way to a shelter.

The shelter manager issued a shelter registration form which we were asked to complete. When this was done duties were assigned. Members of the class were placed into teams consisting of Recreation, Radiological, Safety, Bunking, Feeding, Supply, and Health. I was assigned as a member of the Feeding Team. The shelter was not in readiness to receive the group but rather the necessary supplies were in the shelter, the improvised toilet had to be assembled, food tins opened, fire-extinguishers checked, batteries placed in flashlights, medical supplies checked.

By 1100 hours the situation had cleared somewhat. The toilet had been erected and the general rules for its use were outlined. At this time the feeding team issued one quart of water to each person, this being the ration for a 24 hour period. Two of the triple bunks were taken down to make additional room for recreation and teaching purposes. The middle bunk

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of the three tiered bed was also removed to make room to sit down on the lower bunk.

At 1200 hours 8 double biscuits were issued. This was to be the ration that would be issued three times a day. Each biscuit contains 60 calories or 480 calories per meal and 1440 calories per day. The biscuits resembled a graham wafer in size but seemed to have no particular taste whatsoever.

At approximately 1230 the room became quite smoky. The shelter manager asked the group to discuss what smoking arrangement should be made. Should the group cut out smoking entirely? Should smoking be allowed only at certain times or in certain areas? Should a certain or fixed number of people be allowed to smoke at one time? This problem was discussed and the group arrived at the decision that no smoking was to be permitted when sitting on a bunk, rather one would have to smoke in the open area of the shelter. This was to be a temporary ruling as the group felt that if the condition did not remedy itself a more stringent action would have to be taken.

The group also discussed the time at which the lights would be dimmed and that people would go to bed. In problems of this nature, the Shelter Manager did not state the time at which the class would retire, rather he left it to the group to decide. In the early problems when the shelter manager would ask the class a question like, "What time shall we put the lights out?", often it was found that no one in the class would suggest a time. Therefore, the shelter manager would say "Shall we put the lights out at midnight?", the usual answer to this would be, "No, that is too late." Then the shelter manager would say, "Shall we put the lights out at 800 P.M.?" and the general answer by the group at large would be "No, that is far too early." In this way the shelter manager would not state the time but would indirectly get the group to arrive at a common time. In this particular case, it was decided by the group that lights would be dimmed at 10 o'clock. In every case throughout the period of stay in the shelter, all problems were solved using the group discussion or "group dynamics". I may say that the method used in solving the problems by the group proved very satisfactory.

Throughout the day, discussions were held on a number of problems. New York was attacked with a 10 megaton and 1 megaton weapon with the ground zeroes in such a position that the shelter was in an area of heavy fallout, 3000 roentgens per hour at H plus 1 hour. This was shown on a meter which was hooked up to the control room. The temperature and humidity were recorded every hour on the hour as well as the oxygen and the carbondioxide readings. A security watch was posted. This consisted of a team of 2 which worked a two hour shift around the clock. There was no provision for washing and small Wash 'n Dri were issued. These consisted of a small piece of treated cloth, sealed in a foil package. When opened the cloth is slightly damp and moisture seemed to evaporate rapidly once the face and hands had been 'washed'. Two a day was the issue for this item. In addition, a small dental tablet called a Foam-ette was issued. These were placed in the mouth, allowed to dissolve and then swished around the teeth and the liquid expectorated.

Each candidate had to fill in his or her radiation exposure card and a Diary of Fallout Shelter Experience. The temperature of the body was taken twice a day, at 0800 in the morning and 9 o'clock in the evening. At 9:30 P.M. the bunking team erected the middle bunks and at 10 o'clock the lights were dimmed. So started the first night.

Tuesday—May 1st.

The class was up at about 0700 hours. The bunking team took down the middle bunk, the morning ration of biscuits was issued as were the wash 'n dri and foam-ettes. Not everyone took the full issue of biscuits although everyone was allowed to take up to 8 double biscuits. Many in the shelter complained of headaches, although I felt fine. The morning class discussed radiation intensities, probable effects of the bomb, and the total dose of radiation received to date. We also discussed the length of time that we would have to stay in the shelter if this was a real attack.

1100 hours—At this time there was a complete change of duties. I was reassigned to the Health and Sanitation team, each member of the previous days team briefed the new members. The majority of the class had headaches and took aspirin for relief. The second quart of water was issued. My container was dry although I noticed that several in the room had not used their entire quota.

1200 hours—One woman asked to leave the shelter. She felt that she could not stand another day of confinement. Permission was granted, I never saw her again and I presume she packed her bags and left. Food was issued. I ate my full quota although many did not. The shelter manager outlined that everyone should try to eat the full amount as we did not know how long we would be confined and strength must be maintained.

The remainder of the day was much like the first. I found it quite remarkable that 23 unknown and strange people could be so friendly and sociable in such a short time.

The most interesting part of the afternoon class discussion was a lecture on "How to Deliver a Baby in an Emergency". This was presented by a candidate, Miss Elizabeth Eicherly, a reg. nurse from Harrisburg, Penn. She made what could have been an embarrassing lecture a most worthwhile presentation. I felt tired in the afternoon and did not participate in the recreational period rather I chose to go to bed and sleep. I consumed only 6 biscuits for supper and at that I was eating only because I felt it was good for me to do so. I played cards in the evening for about an hour or an hour and a half. The recreation committee tried to get something going—a singsong, games, etc. but did not have much success.

Ten o'clock and lights out. A few stories were told which gave evidence that we were one family working as a team. The spirit of the group was good. One student did not feel well from mid-afternoon on but his temperature was normal. So passed the night.

Wednesday—May 2nd.

This was much like other mornings, the feeling and spirit was good, perhaps because we knew that we would get out soon or at the worst spend only one more day. Morning classes were spent in discussing total doses received to date. We also discussed the feasibility of sending out a reconnaissance team, the dress of the reconnaissance team, the type of equipment that they would have to take, the amount of radiation that they would receive, the information that they should look for, the type of food that they would bring back if they found a store or place where suitable food could be obtained.

10 o'clock—At this time we were informed that people in a shelter that had a lower protection factor than ours had to be moved in with our group. We were asked how many we felt that we could take. We discussed what effect this would have on our food and water supplies.

11 o'clock—Four men (one of them injured) came to the shelter. They had apparently been working in the area and were close to the maximum exposure and sought shelter. Additional beds had to be erected. They were registered and assigned tasks with the various teams.

Eleven o'clock water rations were issued. My container was again dry and ready for refill.

12 o'clock—Issue of rations, I could not eat more than 5 biscuits.

At 13 hours we were informed that 7 more people would be coming to this shelter. Discussion arose as to bedding arrangements since we had exceeded the bed capacity. This proved an interesting problem and the shift system appeared to be the only answer to the problem.

At 1420 hours the shelter exercise concluded. We left the shelter for a group picture but the camera failed to work. Perhaps this was for the best as I felt we looked like "knights of the open road". There were no classes for the remainder of the afternoon.

All of Thursday, and Friday morning were devoted to discussing the period spent in the shelter. In addition there were a number of lectures dealing with various problems a Shelter Manager might encounter in other situations.

Observations

I found the need for water greater than the need for food, although this was not applicable to everyone in the shelter.

The strangeness of a group is not a real problem when you are kept busy.

The air did not appear stale at any time. Observers outside stated that the air coming off the top of the shelter had an odour but the 3 members of the rescue party said the air was not noticeably foul.

The method of having the group decide on smoking regulations, hours for rising and retiring, etc. has much merit since everyone had a hand in making the decisions and everyone was willing to accede to the wishes of the majority.

The time never seemed to drag. I would estimate that of the 24 hour day, except for the time spent at night sleeping, only 3 or 4 hours were available for recreation, the rest of the time was spent in group discussion or "in shelter training". It is, therefore, ideal to keep people busy and doing something at all times.

The best recreational accessory was the deck of cards. Checkers and chess were also available but only two can play whereas 4 or more people can play a variety of card games.

If the shelter time was longer, calisthenics would be a must. However, this would have to be controlled

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because of space and because the temperature rose rapidly whenever there was group activity i.e. putting up and taking down beds.

It would have been appreciated if a can of jam or jelly could be part of the biscuit ration even if it was issued once a day. In fact anything that would give a slight change of diet would be welcome. However, I am sure that a person could survive for an indefinite period of time on nothing more than the biscuits and water.

The in-shelter training is only as good as the person making the presentation. In the case of health and sanitation conducted by Miss Eicherly, the standard was exceedingly good. However, the presentation on radiation instruments, although presented by a former candidate of a Federal radiological course, contained several erroneous statements.

Conclusion

This was a most interesting course. At the present time the Canadian concept is on the family fallout shelter and to this the Course has no immediate application. I would however, recommend that where and when possible all Civil Defence instructors should attend such a course. I firmly believe, that if everyone in Canada had to spend 2 days in the shelter under similar conditions that the selling of Civil Defence in Canada would be no problem.

If such a course is to be conducted in Canada, a return visit would be necessary to see the exercise from the outside or the directing staff side plus the administrative arrangements that are required for such a course. ▲

Continued from page 2

cations systems, Federal EMO which is the co-ordinating agency and the Department of Transport which is the regulating agency for all civil communications.

c. For emergency communications, in case of failure of the main electricity supply, standby power plant is a necessity and must be provided.
d. For fixed radio stations which must remain in operation under fallout conditions, protection must be afforded to the operating personnel.
e. In other cases, mobile radio stations are essential so that they can be moved as required for the service for which they are being employed.

Conclusion

This article has given an indication of how communications planning is proceeding in the provinces and municipalities, though considerably more needs to be done. Here, as in other matters, the rate of progress depends on the availability of funds. Communications are only as good as the people who operate and maintain the system. There are very few persons permanently employed on civil emergency communications network. Within provinces there are available professional communication agencies such as the telephone companies and departments such as Forestry, who can and do assist in civil emergency communications planning. Below this, civil emergency planning is very dependent on volunteers. Radio amateurs are a source of volunteers used widely across Canada to organize and maintain emergency communications, as well as to assist in training the many additional operators required. This task is proceeding at a steady pace. ▲

A Review of the Literature on Psychological Aspects of Disaster

The following article was originally prepared for ARGUS, the *Maltese Civil Defence Magazine. The author, Morgan Martin, M.D., M.Sc., Chief, Mental Health Division, Department of National Health and Welfare, examines the psychological aspects of Disaster. The* DIGEST *would like to thank Dr. Morgan Martin and the* ARGUS *for permission to reproduce this interesting article.*

Part I

BOTH Canadian and U.S. Americans have contributed to the literature on the psychology of disaster. This paper is based almost entirely on these North American disaster references. It presents material selected from what is known about human reaction to catastrophe. It suggests psychological first aid, as well as positive measures than can be taken and an appropriate attitude for helpers.

The paper is intended for people such as civil defence workers. However, the principles should be of interest to all who are concerned with survival.

Study of the results of the atomic bombing of Nagasaki, Japan, showed that 14 out of every 100 people one-half mile from the point of explosion and 69 out of every 100 people at one mile survived. Without any warning or knowledge of atomic bombs these people were able to save themselves. How much better would they have done with reliable information and warning? (13)*

Although everyone is aware that nuclear bombs can be delivered against cities, most are unprepared and little is being planned to mitigate consequences. (14)

Disaster Concerns Human Behaviour

Behaviour is so heterogenous that it defies description in terms of a few simple categories. (11)

In all disasters, whether from the forces of nature or from enemy attack, the stresses are of a severity and quality not generally encountered. Reactions may be quite different from usual behaviour. (3)

Further, in a disaster, instead of an individual or small group reacting, there is a mass response. (8)

A disaster . . . is not a homogenous totality which is related to or can be coped with as a single event. A disaster is . . . a varied sequence of problems. (12)

The most significant problems of behaviour (following a disaster) derive from social disorganization and uncoordinated action rather than from emotional individual behaviour or helplessness of the survivors. (10)

Following the catastrophe the community as a whole will be prostrate . . . the destruction of physical facilities upon which social organization and social cohesion depend produces a period of more or less social paralysis . . . Although there may be some rudimentary social activity, the social organization will be severely crippled and its immediate recovery will depend upon the introduction of social organizations from without. (2)

Studies (of) . . . disasters refute the notion that psychological disturbances render the population of the stricken area completely dependent and helpless. (11)

A disaster-struck population is not, as a common stereotype implies, a dazed, helpless mass. (10)

The stereotyped image of "panic", "looting" and "exploitation' following a major disaster is rejected as a product of "fertile imagination" popularized by novels, movies, radio, and television programs. (11)

Factors in Reaction to Stress

Factors are:

(1) The nature, destructive intensity, and duration of the disaster agent.
(2) The time interval of the warning period.
(3) The adequacy of preparation and training of the exposed population.
(4) The particular time of day.

* Bracketed numerals which appeared throughout the article refer to reference works, a list of which appear at the conclusion.

(5) Whether the family members are separated or together.
(6) The efficiency of C.D. efforts before, during, and after the disaster. (4)

The Warning Phase: Need for a prepared Plan of Action

When people have no prior warnings the recognition of danger is frequently delayed because of the tendency of persons to associate disaster signs with familiar or normal events. (11)

It is difficult to warn people about the threat of an impending disaster unless they have some knowledge or experience relating to that threat. Thus a major program of education and practice is required in advance to train people to recognize and accept warning signals and to take proper action. (10)

The warning phase is something like the biological mechanism of fear which alerts and prepares us to ward off impending danger by fight or flight. (4)

When danger is recognized as imminent and personal, people seek safety or escape and their behaviour is generally adaptive. They usually take action to protect themselves and others, rather than "freezing up" or engaging in emotional acts which increase the danger. (10)

It is very difficult to warn people successfully against impending disaster when they cannot actually perceive the danger and have not experienced that danger. (10)

The ways people respond to disaster warnings are influenced by their experiences and by the groups, communities, societies, and cultures in which they live prior to the disaster. (10)

The possibility of warning is conditioned by the extent to which the different types of disaster can be predicted reliably. The warning message must be clear and specific and should leave no doubt as to the course of action. (11)

People are reluctant to act upon warnings of danger which they do not perceive as immediate and personal because of: (a) the delusion of personal invulnerability; the feeling that "it won't get me"; (b) reluctance to abandon property and personal possessions; (c) the inability to adopt a new frame of reference so as to expect unusual events. (11)

Warning can be effective, especially where there was a thoroughly understood and a well-rehearsed warning signal and plan of action. (10)

It is imperative to have a prepared plan of action which is elastic enough to be adaptable to possible variations in the interval between warning and impact. (4)

The best possible preparation for adequate behaviour in atomic disaster is education and practice. Education should cover the nature and mode of action of the weapons that may be used and the best methods of defense against them. Practice in the use of this knowledge will establish patterns of action that most individuals will be able to turn to rapidly in the post-impact period. (4)

Plans must also seek to provide means of positive care for the needs of large numbers of people who are so "stunned" and "bewildered" or otherwise disturbed as to be incapacitated. Specialized psychiatric attention will be impossible for most of the people, thus *the means of dealing with emotional problems must be built into the whole structure of the post attack welfare and rehabilitation program.* (10)

Emotional Reactions; The Trilogy

The characteristic psychological abnormalities produced by major disaster are acute transient emotional reactions. (11)

Many research studies have been done on the individual reactions to disasters. These reactions have been divided into three overlapping phases. (8)

(1) Impact
(2) Recoil
(3) Post-traumatic period (2) (10) (1)

The Period of Impact

The period of impact is the period of maximal direct effect of the disaster and is characterized by the presence and effect of initial stresses. The duration varies from a few minutes to an hour or more.

Psychological reactions separate the population into three main groups:

(a) The "cool and collected"
(b) The "stunned and bewildered" which make up about three-quarters of the survivors and might be called the "normal" response. (2) (10) Many intense stimuli will occur during this period and may produce a momentary period of mental confusion. During this "stunned" period most persons may exhibit body reactions (e.g., nausea, sweating, etc.) but the right kind of training will shorten the period of uncontrolled activity or stunned immobility. (4)
(c) The last group will show states of confusion, paralyzing anxiety, hysterical crying, and so on. (2) (10)

Certain acutely unpleasant feelings and disturbances in bodily functions which are not disabling will be temporarily experienced normally by many persons involved in severe external stress. Only when such behaviour is persistent is it considered abnormal. This group calls for no particular management or treatment. Some of these normal disaster reactions are:

(a) Increased muscular tension, i.e., a momentary "freezing" of all muscular activity.

(b) Increased bodily responses, i.e., profuse sweating, nausea, occasional vomitting, rapid heart beat, giddiness, breathlessness, etc.

(c) Psychological manifestations, e.g. increased noise sensitivity, apprehension, irritability, transient apathy or "stunned" response, temporary helplessness, over suggestability, sadness, resentment, impulse to flee, difficulty in making decisions, fatigue, excitability, etc. (4)

Most victims are temporarily stunned, confused and somewhat disorientated after the impact of sudden disaster. Some persons remain in this state, and others relapse into it immediately after performing minimal tasks to help themselves and others nearby, and appear to incoming rescue workers to be in a state of "shock". Some of these persons require special guidance and attention . . . (a) The number in such "shock" states with automaton-like behaviour is small. (b) Most individuals are probably performing less efficiently and discerningly than they normally do. (c) Many of the persons who seem to the outsider to be in a state of shock are not but are deeply pre-occupied with something important to them, such as searching for loved ones. (d) Apathetic or dazed behaviour may appear after victims have received help and can relinquish rescue tasks, and (e) Substantial proportions of the populace soon regain enough equilibrium to engage in useful rescue and welfare tasks. (10)

Although most persons may temporarily be stunned, confused, and somewhat disorientated after impact, they usually regain sufficient self-control within a brief time to extricate themselves, if they are physically able, and assist family members, neighbours and friends. (11)

The group will look after itself fairly well while the danger is present. In states of emergency the group becomes more important than the individual. It is only later that the individual begins to show nervous symptoms when he has the opportunity to consider what has happened and in a conscious or unconscious way to assess the possibilities of obtaining retribution or gain from some organized body such as the Government, the Red Cross, etc. Sometimes the thought enters the subject's mind . . . that unless he can show that he is suffering (feign) from definite symptoms he will not receive satisfactory compensation. (1)

Five Types of Reactions to Disaster:

(a) Normal transient reactions to stress. The great majority show obvious signs of disturbance according

to the nature and magnitude of the disaster (e.g. perspire profusely, tremble a bit, or feel weak and nauseated). Clear thinking may be difficult for a time. Most regain composure fairly rapidly. (3)

(b) Individual panic (Blind flight). The outstanding character of panic is its blindness. All judgment seems to disappear and to be supplanted by an unreasoning attempt to flee. Situations most conducive to this type of behaviour are those where known escape routes are threatened. The importance of this explosive group lies in they may easily provide the nucleus for the development of a general panic. Consequently their segregation and control is urgent. (3)

(c) Depressed reaction (slowed down, numbed). In disasters many people will act for a time as though they were numbed. They may sit or stand in the midst of utter chaos as though they were alone in the world . . . They seem to be completely unaware of the situation and devoid of an emotional reaction to it. They are unable to help themselves without guidance. (3)

(d) Overly-active responses. Some of the disaster victims will explode into a useless flurry of activity . . . They appear to flee into an unreal confidence in their ability. (3)

(e) Bodily reactions. Some of the victims suffer from a bodily disability termed "conversion hysteria". The person unconsciously converts his great anxiety into a strong belief that some part of his body has ceased to function. For all practical purposes he may be unable to see, or to hear, or to speak. All feeling or power may disappear from one or more limbs. Such people are not "faking" and are just as disabled as though they had a physical injury. (3)

Although the disaster reactions described above have been separated into five categories, it is important to realize that any one disaster victim may show some features of more than one category simultaneously or at successive stages of his reaction. (3)

Social Disorganization

During the period of impact the social "fragmentation" is immediate and extensive. Members of families and close friends are separated and at the same time the function of various social institutions and social roles may be impaired or destroyed. (2)

This social disorganization does not necessarily indicate individual irrationality or personal disorganization. (11)

To an outside observer the initial behaviour of persons in a disaster-struck area is likely to appear completely irrational, chaotic, and confused. In the physical devastation surrounding him, the observer sees what appears to be aimless, random, uncontrolled, or conflicting activity on the part of the survivors.

It is this lack of uniformity in action that often leads the outside observer to the erroneous conclusion that the population has "panicked". What the outside observer is witnessing is not panic, but social disorganization. (11)

Wholesale "panic" . . . has not been a common finding at the level of larger communities is disasters, particularly where some prior plan exists. Evidence from Halifax, Hamburg, Hiroshima and Nagasaki indicates that although some immediate and large-scale exodus may develop, more typical is momentary escape, return and purposeless activity. (2)

When danger is recognized as imminent and personal, people seek safety by flight, by taking shelter, or by combating the disaster agent. (Flight, here, does not necessarily mean panic or uncontrolled flight). (11)

Panic Tendency

The panic of individuals occurs more frequently than mass panic. While individual panic can spread, the development of such a condition can usually be stopped by appropriate measures. (10)

Panic is most likely to occur when

(a) people perceive an immediate, severe danger;
(b) they believe there are only . . . a limited number of escape routes from the danger;
(c) they believe these escape routes are closing so that escape must be made quickly, and
(d) there is a lack of communication to keep them informed of the situation. (11)

Flight is one means of escaping danger. It is more often orderly and controlled rather than disorderly or panic-stricken. It is often the only rational choice if one is to survive and should not be equated with cowardice. (10) ▲

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Assessment of Nuclear Attack Hazard Probabilities

The following article was prepared for the EMO National Digest by Dr. James C. Pettee, Director, Analysis Division, in the U.S. National Resource Evaluation Center, Office of Emergency Planning.

Part I.

The Need for Calculating Probabilities of Attack Hazard

TO PROVIDE an adequate base for planning pre-attack programs designed either to minimize attack effects or to facilitate recovery, it is necessary to assess the attack hazard probabilities associated with any attack that might occur, for all points and all resource categories involved.

Part II of this article deals with some technical aspects of the assessment of probabilities of attack hazards. Before going into the technical background, the purposes for which the assessments are required will be outlined, since the nature of a study will proceed from the type of planning towards which it is directed.

Both active and passive defence measures are necessary to maintain readiness to carry out wartime missions, civil defence functions, logistic support, mobilization of resources, and reconstruction and recovery. Planning for such defence measures should take cognizance of the range of hazard conditions likely to be experienced at the many resource locations, and of the probability that these conditions will result from nuclear attack. Absolute protection of any particular resource or facility against nuclear weapons is not attainable at any cost, but a substantial probability of survival of a function or resource is attainable by appropriate combinations of active and passive defence measures. Among these measures would be included: alert status, hardening, mobility, alternative facilities and substitution. Quantitative estimates of probability of experiencing varying degrees of attack effects are required for the evaluation of the effectiveness of alternative defence measures, or combinations of defence measures, in relation to their costs.

Although specific case studies such as individual war games and "exercise" attacks used in Operations Alert (the U.S. series of national exercises) are very effective and useful in portraying the effects of nuclear weapons, by their very nature they do not provide an adequate basis for planning. Specifically, as they are case studies:

a. They deal with only a single attack plan—resultant planning would cover only the one contingency.
b. Chance variations in the application of operational factors result in a "go" or "no go" of a weapon detonation on a single trial basis so that the probable threat to any location is not defined.

A probability study, by being based on jointly agreed military assumptions and judgments, by considering a spectrum of plausible attack plans, by providing a range of damage effects on a probability basis, and by applying Monte Carlo techniques to operational factors, represents an improved base for defence planning for a nuclear war.

Hazard probability data, derived from approved military assumptions, will serve as a basis for government-wide planning for a variety of purposes including civil defence, passive defence, post-attack recovery and reconstitution, and development of the mobilization base. The advantages of coordinated planning in these areas of both military and non-military agencies of government are obvious and, at a minimum, should result in more acceptable, better meshed, properly phased planning concepts and programs.

Following are some examples of potential uses for probability data. There are other significant applications of the data from this line of analysis, however, the illustrations which follow are intended to indicate a selection of various methods of use.

a. Military Support Planning

(1) *Minimizing vulnerability of logistics support,* both material and services, is dependent on an analysis of the relative vulnerability of specific point locations.

(2) *Manpower availability* can be derived on a probability basis for use in manpower planning for the potential post-attack period. Data on population, both civilian and military, are available in terms of

a range of probabilities of casualties, fatalities and uninjured. These data can be presented in any desired degree of geographic detail or summary, e.g. civilian population by national, regional, state, metropolitan area; and military areas such as Army Area, or Naval District.

(3) *Reconstitution and recovery planning* for the military may be based on quantitative probability data for potential damage to, and survival of, various key elements of the military recovery base, such as the military active and reserve population. In addition, for specific locations such as posts, camps, ports, training and staging areas, and depots, there are available detailed probability tables or point summary data which can be used to develop probable surviving units, facilities or other resources. The range and inter-relationship of survival probabilities for these key or critical recovery elements provide a basis for planning reconstitution and for recommending actions necessary to improve potential bottleneck conditions.

(4) *Post-attack industrial and maintenance planning* must be related to reconstitution planning and to probable surviving production and maintenance facilities. If such facilities can be classified as to probable survivability and availability, it is then possible to direct the planning effort to those facilities most likely to be available in a post-attack environment. Such data are available on individual maintenance and production facilities, planned for or engaged in military production, as well as those engaged solely in the civilian sector of the economy. In addition, there is an output format available which will classify facilities by likelihood and timeliness of availability, thereby eliminating a massive clerical effort involved in such classification if it were to be done manually.

(5) *Protective construction and dispersal programs* must take into account the probable physical damage likely to occur at the various locations to be provided protective construction or to which dispersal is planned. For example, in planning protective construction, it may be undesirable, based on probability of damage, to provide fallout shelter without blast protection to a facility located at the same place as a high priority target; whereas for another facility of the same type removed from likely targets, fallout shelter may provide the degree of operational protection required. In any event, quantitative estimates of probable hazards and costs of ameliorating or eliminating those hazards must be considered together in developing and evaluating protective construction or dispersal programs.

(6) *Continuity of operations planning* includes the selection of alternate headquarters, relocation sites, communications routes, and back-up support capabilities. Realistic planning for continued operations in the post-attack environment must recognize probable damage to, and relative vulnerability of these selections.

b. Non-Military Support Planning

(1) *Planning for continuity of government* in the United States is similar to planning for continuity of operations in the military sphere. It must consider the same spectrum of factors listed above. When dealing with elected officials, such planning may be limited by legal considerations; however, the assurance of continuity of sovereignty will require dispersal measures related to probable risk. For most U.S. federal agencies, the problems presented in planning continuity of central headquarters and field activities are similar to military continuity of operations problems, and they can be dealt with in the same manner. Usually, the civilian elements of government can provide for greater flexibility and survivability because duplicate skills are available in the population and their functioning is not usually limited by the availability of equipment. Accordingly, quantitative hazard probability and relative vulnerability data for various locations can be extremely useful in continuity of government planning.

(2) *Shelter program planning* must be related to the potential threat, the range of physical damage, the exposure to radiation, and the probabilities that these might be experienced. Armed with such quantitative data, a shelter program can be designed in manageable increments, each of which provides protection to meet the likely range of probable hazards. Here, as in military protective construction, the benefits to be gained can be measured against the alternative costs, and appropriate recommendations made. This line of analysis provides an authoritative basis whereby a variety of protective construction programs can be assumed and the probable impacts on population casualties computed.

(3) *Radiological monitoring planning* can make use of probability data on blast and radiation intensity as a guide to the stocking of radiological monitoring devices, and for the selection of centres with high probability of survival for training and cadre work. Maps showing the probability of weapon effect can be used for this purpose. If greater accuracy is required for individual locations, this can be obtained from the point location tables, either in detail or in summary.

(4) *Emergency operations planning* must be geared to the range and likelihood of damage to the population, their housing and their supporting utilities. Plans which go beyond the paper stage must be based on quantitative estimates on these factors. The ranges and probability of damage conditions for specific metropolitan areas, states, or other geographic or jurisdictional

entities are available in, or can be derived from, this study. Such data will provide a realistic basis for planning, while eliminating the problems of depending on a single exercise result such as obtained in an Operation Alert.

(5) *Resources management planning* is conducted at every level of government, local, state and federal; and within the federal resource agencies. Resources management exists to varying degree in the field, at regional headquarters and at the seat of government, with the degree of centralized or decentralized control dependent on the specific resource under consideration. In order for all such planning to be consistent and coordinated, first among all resources, and secondly among the various levels of government, a quantitative data base is required which is consistent internally. This line of analysis provides the necessary quantitative data base for the nation, and with appropriate direction from the the resources management agencies, can provide a tool for coordinated resources planning geared to meet a range of probable damage conditions.

(6) *Essential Survival Items Program planning* identifies survival items, their potential shortages in the post-attack period, and makes recommendations for corrective action, if necessary. This program is a facet of the broader resources management problem. The use of probability data presents an opportunity to develop incremental programs dealing with conditions either in the order of probability of occurrence, or in the order of severity of damage, or other priority arrangement. In each case, the planning increment can be evaluated in terms of its cost and incremental benefits.

(7) *Stockpiling program planning* was initially directed to a non-nuclear emergency, but more recently has been expanded to encompass nuclear damage considerations. Such considerations must be applied to requirements and assets of these critical, strategic raw materials, as well as to their storage locations. This line of analysis provides the quantitative data for use in planning the stockpile and in minimizing its vulnerability.

(8) *Industrial planning* in support of the civilian economy, its recovery and reconstitution, is not different in quality from that described above, for military industrial support. It does, however, cover a much broader base of industry than does the military, and therefore may be more amenable to summary treatment.

c. Overall Program

It is not intended to convey the thought that any one study will be suitable for use at every level and for every purpose. No study can be a panacea for support planning. However, a combination of the potential uses, indicated above, coupled with other coordinated efforts to develop supply-demand comparisons for resources will provide a basis to determine and examine the probable capabilities of post-attack residual resources of the nation, and of the military services. The results of such studies will indicate to planners, in civilian agencies and in the military, those areas which require special study consideration and recommendations for corrective action. The analysis itself does not provide the answers required of planners, but it can provide information on a range of probabilities which will permit planning to proceed on an authoritative basis and in a realistic and flexible manner. ▲

(Dr. Pettee's article will be concluded in the December issue of the Digest.)

Emergency Health Supply Stockpiling

The following article was prepared for the DIGEST by J. Earle Matthews, Phm B. Mr. Matthews is the Pharmaceutical Consultant to the Chief Emergency Health Services Division, Department of National Health and Welfare.

THE likelihood during a major disaster of immediately having large numbers of living casualities requiring early medical care, remains the greatest problem to the health profession of Canada.

The number of casualties who would survive during such a catastrophe would depend upon the quantity of health supplies immediately available to the health professions and the number of personnel available to use the supplies.

Past experience has shown that disasters invariably create a demand for quantities of essential supplies far beyond the resources of any one community, however large or small it may be. During the post-disaster period of a nuclear attack the total quantity of these demands would far exceed the normal existing resources of the nation.

The seriousness of such a situation is further emphasized when one considers that it sometimes requires from 12 to 18 months to procure one item for the reserve of essential health supplies to meet such a situation. And even then more than half of these supplies would have to be obtained from manufacturers in the United States, the United Kingdom, Continental Europe and other countries.

To meet this situation the Federal Government, in 1952, accepted the responsibility of providing a national stockpile of health supplies in peacetime. The stockpile now exists and is being constantly maintained and adjusted to conform with new planning.

The value of the original authorized stockpile in 1952 was $9,000,000. In 1957 the value increased to $11,000,000 and in 1960 to $18,025,000 as the first phase of an emergency hospital programme came into effect.

The main purpose of the Emergency Stockpile Programme is to have large quantities of essential health supplies strategically located across Canada and therefore available in the first few hours of the immediate post-disaster period.

The Federal Emergency Health Services Division maintains close relationships with the health professions, their associations and the pharmaceutical and allied industries. The Health Supplies Section is responsible for:

1. Determining the requirements of essential health supplies for use of a civilian medical service during the emergency and rehabilitation period.
2. Maintaining a national stockpile of essential health supplies.
3. Co-operating with the Emergency Supply Planning Branch, Department of Defence Production in studying and developing techniques for the control and distribution of health supplies.
4. Studying the capability of pharmaceutical, medical and associated industries to restore production during a period of emergency.
5. Assisting in the planning for the preservation of facilities for the production of essential biological materials.

The authorized stockpile would provide for twenty-one days after an all-out atomic attack on Canada. This would be the acute period and the stockpile would make a region self-supporting until additional health supplies for the rehabilitation period could be transported into the region.

The quantity of supplies recommended and the medical units to be organized to use them were determined after consideration was given to the manpower potential in Canada of doctors, nurses, dentists, pharmacists and members of other professional groups. The stockpile will provide the Emergency Health Services with the following medical units*, re-supply and training items:

600 Advance Treatment Centre Operational Units
600 Casualty Collecting Units
Backup Hospital Supplies for 200,000 casualties at emergency and existing hospitals
28 Emergency Blood Services Shadow Depots
2800 Hospital Disaster Units #1

* These units will be described in the next issue of the Digest.

200 Emergency Hospital Operational Units
100 Basic Clinic Laboratories
20 Transportable Public Health Laboratories
400 Emergency Clinics
30 Advance Treatment Centre Training Units
16 Emergency Hospital Training Units
2 Emergency Blood Services Shadow Depot Training Units.

Organization

A sub-committee of the Emergency Health Committee which is composed of members from the Department of Veterans Affairs, the Canadian Forces Medical Service, the Department of National Defence and the Emergency Health Services of the Department of National Health and Welfare, is responsible for the detailed planning of the stockpile programme. Overall supervision of the programme is the responsibility of the Emergency Health Services Division and the Health Supplies Section of the Division is responsible for direct supervision. This direct supervision includes:

1. Providing a pharmaceutical and health supplies consulting service.
2. Procurement, packaging, marking, warehousing, distribution, inspection and rotation of dated and perishable supplies.
3. The training and organization of pharmacists and allied personnel into an effective Emergency Health Supplies Service.
4. Organization and implementation of a Health Supplies Resources Programme.

The programme is under the direction of the author who is assisted by five officers and a sub-staff.

Stockpile Management

The procurement programme is co-ordinated by the Emergency Health Services Division with the Departments of National Defence and Defence Production. The Division determines the items to be obtained and administers the funds.

Packaging presents special problems. Because of the need for rapid distribution and immediate use normal peacetime packaging for warehousing frequently is unsatisfactory. A packaging unit prepares all items for long term storage before the supplies are grouped into medical units. The supplies are assembled by areas within a unit on a functional basis. This type of arrangement reduces to a minimum the number of issues from the supplies area of that unit. Also, by means of the functional packaging, the units would be able to go into action without delay.

Because all areas would not receive the same number or type of casualties the programme also provides for bulk supplies. These items can be warehoused in the cartons, boxes and crates provided by the manufacturer thereby making it possible to issue the items either in large or small quantities.

Because of Canada's great distances health supplies cannot be quickly or efficiently provided from one central warehouse either in peacetime or in war. And a nuclear attack would also present the problem of disruption and extensive damage to transportation systems.

For this reason, Emergency Health Services has adopted a decentralized storage system which extends from a central depot in Ottawa to warehouses and dumps surrounding likely target areas. These warehouses and dumps whenever possible are located in areas close to likely targets having a good network of roads and railways and close to air and sea transport facilities. This reduces the time required to move the supplies to disaster area.

Responsibility for warehousing the supplies has been assigned to the Department of National Defence for the following reasons:

1. It was considered advisable not to set up a separate warehouse system but expand the existing system wherever possible.
2. The rotation programme for dated and perishable items can be very effectively implemented by the Department of National Defence warehouse system. This is done in co-operation with the Canadian Forces Medical Services; Treatment Service of Veterans Affairs; Indian and Northern Health Services of the Department of National Health and Welfare.
3. The location of these depots in the system provides protection for narcotics.

The amount of supplies assigned to each depot depends primarily on the size of the population to be served. Storage is under federal control.

When the supplies have been sorted into medical units and packaged they are shipped to Regional depots under federal control or directly to provincial authorities for storage.

In order to bring the supplies as close as possible to organized units, it will be necessary for each province to organize a depot system that will meet federal requirements. The most important depot in such a system will be a warehouse in each zone of the Region under the control of the Provincial Emergency Health Services.

The Stockpiling Programme when completed will make Regions and Provinces self-supporting for 30 days and the nation self-supporting for six months.

Within Provinces and Municipalities it will be necessary for each medical centre to earmark a building in peacetime that can be used in wartime as a medical centre depot. The size of this depot will depend on the nature and magnitude of the task assigned to that medical centre. The quantity of health supplies in this depot should be sufficient for a medical centre to be self-supporting for seven days.

Each likely target area will be required to organize depots or dumps in sufficient numbers to store enough supplies for the medical task assigned to it and to make the area self-supporting for seven days.

Arrangements are being made with the provinces for the peacetime prepositioning with organized medical units of Advanced Treatment Centres, Emergency Hospitals, Emergency Blood Shadow Depots and other health supplies needed in the post-disaster period. An organized medical unit may be an existing hospital or the headquarters of a Provincial Public Health Unit. The supplies will be stored at the hospital or the site where the hospital would use them, whereas the Public Health Unit will store them at their headquarters and would issue them to an organized medical unit. All prepositioned supplies will be in the custody of the organized medical unit and the Provincial Department of Health will have overall responsibility for them.

It is obvious that a substantial procurement programme is essential for the stockpiling described. To date the Emergency Health Services have on order supplies valued at $15,500,000. The deliveries as of September 1st, 1962, amounted to $12,500,000. The remaining supplies valued at $3,000,000 will be procured at the earliest opportunity.

The deliveries as of August 31st, 1962, are sufficient to complete the following medical units:

600 Casualty Collecting Units
600 Advance Treatment Centre Operational Units
Supplementary supplies for 200,000 casualties
16 Emergency Hospital Training Units
2800 Hospital Disaster Supplies Unit No. 1
30 Emergency Blood Service Shadow Depots
3/5ths of the supplies for 184 Emergency Hospital Operational Units.

The Packaging Unit at the Central Depot at Plouffe Park, Ottawa, has completed the following projects:

420 Advance Treatment Centre Operational Units
30 Advance Treatment Centre Training Units
2800 Hospital Disaster Units No. 1
600 Casualty Collection Units
2/3rds of the supplies for 16 Emergency Hospital Training Units
1/10th of the supplies for 184 Emergency Hospital Operational Units.

Supplies valued at $6,000,000 have been distributed among Regional Storage Depots at Chilliwack, B.C., Saracee, Alta., Shilo, Man., Valcartier, Que., Camp Borden, and Camp Petawawa, Ontario. And the depot at Debert, N.S., will be in use before the end of 1962. Plans also call for the storage of supplies at MacDonald, Man., early in 1963.

Resources Planning

In addition to the Stockpiling Programme, Emergency Health Services also is responsible for planning a resources project which will provide the information regarding the health supplies needed for a six to twelve months rehabilitation programme.

At the time of a nuclear war, the War Measures Act would bring into being a War Supplies Agency charged with the responsibilities and authority for all aspects of control over production, distribution and pricing of supplies, both civil and military. The Emergency Supply Planning Branch is the peacetime planning agency for the War Supplies Agency.

Emergency Health Services will furnish the Emergency Supply Planning Branch with information concerning all health supplies. In order to accomplish this, a resources planning unit has been established in the Health Supplies Section. It will carry out surveys and do assessment programmes with respect to pharmaceuticals, hospital and other related health supplies to determine the requirement of the health profession for the rehabilitation period.

Reference was made earlier to the Health Supplies Section's responsibility for organizing and training pharmacists and allied personnel to form an effective Emergency Health Supplies Service. Since 1955 the pharmacists of Canada have indicated to the Federal Emergency Health Services that they are prepared to assume staff appointments at all levels of control as full-time officers or on a volunteer basis. Several provinces have named volunteer pharmacists to positions

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Planning a Resource Analysis System

The following article has been prepared for the DIGEST by J. G. Bowland, Economist, Emergency Supply Planning Branch, Department of Defence Production.

A NUMBER of government agencies at the provincial and federal levels are engaged in studies of resources in relation to nuclear attack hazards. Within the supply field at the federal level, studies have been undertaken or are being started on food, fuels, medical supplies, and a range of other essential materials.

The Government has decided that should a nuclear attack be made on this country, a War Supplies Agency (WSA) would be created and charged with full responsibility for all aspects of control over the production, distribution, and pricing of supplies, both civil and military, with the exception of the agricultural and fishing industries, and certain aspects of food processing. The Department of Defence Production has been given the task of making various peacetime arrangements necessary to permit a War Supplies Agency to come into effective existence immediately on the outbreak of a nuclear war. To carry out this work, an Emergency Supply Planning Branch has been formed within the Department.

Organizationally, the War Supplies Agency must conform to the arrangements being made through the Emergency Measures Organization for a decentralized system of emergency government with central, regional, zonal and municipal components. Moreover, the regional, zonal and municipal components of the War Supplies Agency must parallel the central, or national, component both functionally and organizationally, so that they could operate independently if cut off from higher authority. Also, the War Supplies Agency must be sufficiently flexible in its organization at all levels of emergency government to permit rapid expansion and change, if required, once circumstances permit the beginning of a return to the normal facilities and methods of government.

The purpose of this paper is to outline the work of the Research Unit of the Emergency Supply Planning Branch in support of the peacetime arrangements assigned to the Branch. The work of the Unit is divided into three programmes, each of which will be briefly reviewed. A summary description will then follow on the various phases involved in the development of a "resource analysis" system which can be easily utilized without recourse to complex computing machinery.

Each of the programmes is aimed at fulfilling a particular function in response to the needs of the WSA components at the national, regional, zonal and municipal levels. One is directed towards creating a resource analysis system which, depending on circumstances, could be employed at any of the four administrative levels. In developing this programme so far, the planning has been concerned with the 30-day survival period, or shock phase. It consists of locating and measuring in physical terms the stocks of essential consumer items that would be most needed during the immediate post-attack period. While designed primarily for municipal and emergency government zones, the system may also be used at regional and national levels in case of disruptions in communications between centres. Another aspect of this project is the necessity to build into it a capacity to interpret technical reports from the Army's Damage Assessment system and to assess the results with regard to essential resources. The creation of a resource analysis system that is compatible with a 4-tier decentralized administrative structure, as well as Army operational reports, tends to introduce unfamiliar notations and procedures. To achieve some balance in the over-all programme, a training syllabus is being developed to enable resource analysis to be carried out in a uniform manner at all levels of emergency government.

A second programme has been initiated to estimate the economic consequences of nuclear attacks on probable target cities. Based on certain assumptions, statistical analyses have been prepared on stocks of petroleum products, food items and on value output of selected major industries. The object of these analyses is to have peacetime assessments readily available on quantities of stocks and productive capacities that likely

would survive if target cities were attacked. This involves studies on the geographic location of resources in relation to target cities, and the calculations provide a ready reference for regional and national centres in determining the vulnerability of essential stocks and productive plants within regional geographic boundaries.

The third programme consists of the preparation of descriptive and analytical studies of the economically significant features of each emergency government zone. Emphasis is placed on the location of factors of production in relation to target cities. The studies integrate and in some cases supplement existing material that appears in various publications, and are designed primarily for the use of officers at zonal and regional centres of emergency government.

It was noted earlier that a summary would follow in the steps taken to develop a manual system that can be used for resource analysis. The term "resource analysis" refers to a technique for assessing the quantities of material resources that would survive a nuclear attack. The first requirement for implementing such a technique is to establish procedures for locating and measuring peacetime resources.

As the agency most capable in the field of collecting resource data, the Dominion Bureau of Statistics has co-operated in making its facilities and technical personnel available for this purpose. The Bureau has surveyed, compiled and processed a considerable amount of data on stocks of food, lumber and coal, and made these data available on a confidential basis after having received prior authority from respondents. Surveys conducted by the Bureau are confined to the processing, manufacturing, wholesale and warehouse or storage levels.

At the retail level, major outlets of food and clothing will be surveyed under a co-operative arrangement through the Emergency Health Services Division of the Department of National Health and Welfare and its counterparts in provincial departments of government. Supplementary to their stocks surveys, the Bureau has made 1961 census enumerator cards available on selected kinds of business at the retail and wholesale levels, as a first step preparatory to listing these establishments by emergency government zones. In this programme, as well as in others requiring data processing equipment, the Economics and Statistics Branch of the Department of Defence Production has either made its facilities available or arranged the use of existing facilities in other Departments.

In general, the stocks data collected by the Bureau on behalf of the Emergency Supply Planning Branch have been recorded and listed in a form that would

be useful to regional and zonal administrative components under conditions of an emergency. In organizing and presenting the data, certain principles have been followed.

First, uniform units of measurement were selected for each group of commodities. In the case of food items all units were converted to pounds and for petroleum products "barrels" was selected as the unit of measure. Second, the data on stocks are listed by location within each emergency government zone. The quantities of each commodity are aggregated to show sub-totals for each zone. Within each zone, the quantities stored at each establishment are listed separately. Each establishment is identifiable by means of a code number. Provision is made to have these code numbers cross-indexed to master lists of company names. Finally, code numbers are also used to identify production and processing plants as distinguished from wholesale, cold storage and other types of non-productive storage facilities.

While prototype lists have been processed and distributed to regional centres on 20 food items, 8 petroleum product groups, 3 building materials, and 5 types of coal, current surveys have been expanded to include 47 food items and 83 clothing items. The most recent print-outs reflect present boundaries of emergency government zones and copies are being distributed to regional centres for retention by Regional and Zonal Offices of the ESPB.

A second essential for a resource analysis system is the capability to interpret on maps the information provided by the Army on nuclear detonations and fallout. The Army reports on four critical characteristics of any nuclear strike. These are: (1) specifying the geographic location of the ground zero of each detonation; (2) estimating the destructive power, or yield, of any weapon; (3) identifying the type of burst as "air" or "surface"; (4) specifying the wind direction and velocity. Data on these features are required in order to estimate the amounts of damage that are associated

with each kind of weapon explosion. A fifth characteristic, time of burst, is essential for reference purposes in connection with radioactive material decay rates and denial time.

To correlate the information communicated by the Army with resource data presented in the form of lists, standard-scale maps are used for each of the target cities and regional and national geographic areas. This introduces the more refined processes that involve hand-damage assessment tools and techniques, a description of which would extend beyond the purpose of this paper.

Peacetime information on the location, degree of concentration and physical quantities of stocks and output, together with an awareness of the channels and forms which the Army employ in communicating characteristics of an attack pattern, are essential to a civil agency responsible for planning supplies. Maps and map traces represent an important channel of communication. These are unfamiliar media but from them it is possible to assess the areas and resources that lie in parts affected and unaffected by blast and fallout. To overcome to some extent the technicalities involved in identifying the location of establishments, together with the commodities processed, produced, or stored by those establishments in target cities, the Geographical Branch of the Department of Mines and Technical Surveys, has conducted a resource mapping project for the Department of Defence Production. The pre-plotted maps that have been prepared so far indicate that the complex and time-consuming task of assessing varying effects of detonations can be reduced.

In conclusion, resource analysis must serve two purposes: (1) represent a source of information which WSA officials could use in an emergency for immediate decision-making in efforts to relieve extreme supply situations and (2) provide the basis for assessing stocks and productive capacity positions during the recovery and rehabilitation phases. To do so, the system employed must be simple in nature, yet capable of producing usable information quickly and flexible enough to be readily adapted to the prevailing circumstances. Without a satisfactory system of resource analysis, the capability of the War Supplies Agency for early effective action following a nuclear attack would be greatly reduced. ▲

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and they now are assisting the Provincial Health Supplies Officer with the development of a Provincial Emergency Health Service.

In 1954 the first Five-Day Pharmacists' Civil Defence Course was held at the Canadian Civil Defence College. A total of seven courses have been held to date. This training has been supplemented at the federal level with four Health Supplies Officer's Conferences and by provincial and local Civil Defence Courses. In 1955 the Canadian Conference of the Pharmaceutical Faculties accepted the responsibility to indoctrinate the undergraduate pharmacy students in Civil Defence. Since 1955 every graduate pharmacy student has been provided with details of Civil Defence problems and planning. The School of Pharmacy, University of Saskatchewan, has made a course in Civil Defence mandatory for graduation.

Unfortunately, space has not permitted discussion of the programme in great detail and many aspects were mentioned only briefly. However, it is hoped that the foregoing has indicated the considerable progress made in the government's emergency health supplies stockpiling programme since its original conception in 1952, a programme designed to provide adequate health supplies and well trained qualified personnel should a national emergency ever arise. ▲

11 STEPS TO SURVIVAL

- **Know the effects of nuclear explosions.**
- **Know the facts about radioactive fallout.**
- **Know the warning signals and have a battery-powered radio.**
- **Have some shelter to go to.**
- **Have fourteen-days emergency supplies.**
- **Know how to prevent and fight fires.**
- **Know first aid and home nursing.**
- **Know emergency cleanliness.**
- **Know how to get rid of radioactive dust.**
- **Know your municipal emergency plans.**
- **Have a plan for your family (and if you are alone, have your own plan.)**

In order to obtain a free copy of any survival booklet simply write to P.O. Box 10,000 in your provincial capital.

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